CLAIMS

WE CLAIM AS OUR INVENTION:

1. A method of repairing a combustion turbine component having damage located at or near a cooling hole or hollow or geometrically complex portion of the component, comprising:

forming a preparatory groove that extends from a surface of the component to the damaged area but does not extend to the cooling hole or hollow or geometrically complex portion of the component, the groove extending 40-90% the distance from the component to the damaged area;

spraying a filler material into the groove with a micro-plasma torch at a current of less than 50 amperes ; and

filling the groove with the filler material such that the heated filler material substantially extends from the cooling hole or hollow or geometrically complex portion of the component to a surface of the component.

2. The method of claim 1, wherein the damage is located at a cooling hole.

3. The method of claim 1, wherein the damage is located near an area of spallation.

4. The method of claim 1, wherein the damage is located near a geometrically complex area of the component.

5. The method of claim 1, wherein the damage is a crack.

6. The method of claim 1, wherein the damage is a chip.

7. The method of claim 1, wherein the damage is caused by oxidation or corrosion.

8. The method of claim 1, wherein the component is a transition duct.

9. The method of claim 1, wherein the preparatory groove extends 60-70% the distance from the component to the damaged area.

10. The method of claim 1, wherein the preparatory groove is formed by hand grinding or machining.

11. The method of claim 1, wherein the filler material is provided in a powder form or a wire feeder form.

12. The method of claim 1, wherein the filler material comprises a ytrria stabilized zirconia composition.

13. The method of claim 1, wherein the micro-plasma torch has a nozzle orifice of about 1 – 2 mm which spreads the powder at an angle of about 10 degrees.

14. The method of claim 1, wherein the micro-plasma torch has a heat input of about 2 – 5 kJ/cm.

15. The method of claim 1, wherein the groove is completely filled with the filler material.

16. The method of claim 1, further comprising smoothing the filler material so that it is substantially planar with the component surface.

17. A method of repairing a cracked combustion turbine component, comprising:

providing a micro-plasma torch adapted to provide a low heat input to the component using a current of less than 50 amperes, the torch operatively associated with a filler material source;

making a preparatory groove along at least a portion of the crack; and

passing the torch along the grove, the crack located at or near a cooling hole or hollow or geometrically complex portion of the component, such that the filler material is heated by the torch and deposited within the crack.

18. The method of claim 1, wherein the crack is located at a cooling hole.

19. A repaired combustion turbine component, comprising:

a superalloy material formed into the general shape of the component ; and

a welded filler material continuously extending from near a cooling hole or hollow or geometrically complex portion of the component to a surface of the component, the filler material deposited by a micro-plasma torch.

20. The component of claim 19, wherein the filler material is substantially planar with a surface of the component.